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## PROCESS OF PREPARING DRY POWDERED VINYL ESTER POLYMER COMPOSITIONS AND RESULTING PRODUCT

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No Drawing. Filed Mar. 16, 1959, Ser. No. 799,478

7 Claims. (Cl. 260—8)

This invention relates to dry powdered compositions based on vinyl ester polymers as a binder.

More specifically the invention relates to compositions of this type which can be readily dispersed in water to form smooth homogeneous dispersions from which hard, abrasion resistant, flexible water-resistant films can be formed.

The compositions of the present invention have particular suitability as dry forms of paints, caulking compounds, spackling compounds and texture finishes.

The advantages of dry polyvinyl acetate compositions for coating and analogous purposes have been recognized. See for example Morrison U.S. Patent 2,800,463, July 23, 1957. Such compositions eliminate problems inherent in aqueous dispersions, namely, that of keeping them stable under varying conditions of temperature and over long periods of time, and of transporting unnecessary bulk in getting the product from the manufacturer to the distributor and to the consumer.

Nevertheless, difficulties have been experienced in formulating dry compositions which can be readily dispersed in water to form a composition from which water-resistant flexible films can be laid down. The greatest difficulties have been experienced in formulating dry free-flowing powders where it is necessary to incorporate a plasticizer and/or coalescing agent for the vinyl ester resinous binder in order to produce films having the above-mentioned desired properties. The reason for this difficulty is that most of the commercially available coalescing agents and plasticizers which best aid in imparting the desirable properties are organic liquids. The mere mixing together of powdered polyvinyl esters, even that resulting from drying emulsions in accordance with the Morrison patent with such other constituents of the composition, will not result in a composition which can be reformulated in aqueous form as a satisfactory product.

The resulting mixture would become badly caked in storage and even after formulation into the aqueous dispersion with the aid of efficient mechanical agitation, portions of the mixture would remain sufficiently agglomerated so that films cast therefrom would have such inferior properties as reduced abrasion resistance, flexibility and hardness.

Although the compositions of the present invention have been termed "mixtures" for ease of reference and common understanding, there is cooperation between various constituents of the dry powder. For example, the liquid plasticizers and/or coalescing agents become absorbed or adsorbed in the pigment. Furthermore, the dispersing agent which constitutes a portion of the emulsion form of the dried vinyl ester polymer is generally bonded directly to the individual polymer particles. In addition, when the dry powder compositions are dispersed in water, there is further cooperation between all of the constituents both in the liquid state as well as the subsequent dried film the particular combination of constituents rendering the dry compositions capable of being reconstituted with water to a solids content of between 30 and 70% so as to form a stable dispersion being capable of being laid down as a film which is water-resistant at temperatures up to at least 150° F.

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The applicants' dry compositions are characterized by the ease of redispersion to obtain homogeneous stable dispersions, simply by hand mixing, as distinct from the critical limitations of the usual formulation methods whereby pigments and other solid constituents must necessarily first be combined with dispersing agents before addition to the liquid polymer binder emulsion to guarantee a stable, homogeneous emulsion. The formulation process for a pigmented polymer dispersion having these properties by the usual techniques involves a critical method of addition as well as a critical selection of constituents, as evidenced by the almost universal use of stabilizing agents in the formulation. In contrast the dry compositions of the present invention provide stable dispersions without absolute need for stabilizers, or thickeners as they are sometimes called. Films produced from the aqueous dispersions obtained from the dry compositions of the present invention, in addition to having the improved properties, will not crack or shrink in normal service.

The applicants have now found that certain constituents properly selected and brought together in critical amounts and in a particular manner can be made to form a satisfactory dry mixture redispersible in water to form a film forming composition. Compositions according to the invention essentially contain a resinous binder in powder form, an organic liquid plasticizer and/or coalescing agent for the polyvinyl ester, a dispersing agent and certain water dispersible inorganic particulate solids.

The resinous binder used is a dried vinyl ester polymer, preferably a dry powder form of the homopolymer of vinyl acetate and/or the dry form of certain internally plasticized polymers of vinyl acetate as hereinafter disclosed. Where an internally plasticized resinous binder is selected there is generally no need for the incorporation of a plasticizer to obtain a high degree of flexibility and water resistance since the binder itself already possesses such properties. On the other hand, the need for a plasticizing or coalescing agent generally remains so that films cast from the dispersions will flow smoothly and quickly to provide a substantially continuous coating before the water evaporates when applied to surfaces even where a form of internally plasticized resinous binder is used.

The inorganic water dispersible particulate solids which are useful in the practice of the present invention can be selected from the general class of paint pigments and extenders therefor, cementitious materials and texturing agents, dependent upon the particular application for the aqueous dispersion. Numerous other agents may be incorporated into the above compositions in addition to the essential constituents described above for the chief purpose of modifying the application properties of the aqueous dispersion and most notable of which are setting-time retarders for the cementitious materials and thickeners. Such modifiers are not required, however, to provide the useful properties heretofore described for films cast from the dispersions.

The preferred manner in which the components of the applicants' compositions can be brought together is as follows: The organic liquid plasticizer and/or coalescing agent for example, is mixed with the inorganic particulate solid. This is preferably done by mixing the latter as in a dough-type mixer, the dispersing agent being slowly mixed in until a uniform state has been reached. Then, the dried vinyl ester polymer powder is slowly sifted into this batch. When this mixture is complete, it is screened to remove any resinous binder which may have been agglomerated by the organic liquid. To prevent agglomeration of the mixture, the organic liquid must be incorporated in with the inorganic particulate solid before contact with the resinous binder.

Substantially complete freedom from agglomeration